Claims:

1. A process for the production of propylene from a C_4 olefin stream containing n-butenes, isobutylene and paraffins comprising the steps of:

a. passing said C_4 olefin stream in contact with a metathesis catalyst whereby autometathesis occurs and an autometathesis product is produced containing ethylene and propylene and heavier olefins including isobutylene and paraffins;

b. fractionating said autometathesis product to remove an ethylene stream leaving a deethyleneized stream of said propylene and said heavier olefins and paraffins;

c. fractionating said deethyleneized stream to remove propylene product leaving a depropyleneized stream of said heavier olefins and paraffins;

d. processing said depropyleneized stream to remove isobutylene leaving a remaining C_4 and heavier olefins stream also containing paraffins;

e. purging a portion of said remaining C_4 and heavier olefins stream to limit paraffin buildup;

f. admixing the remaining portion of said remaining C_4 and heavier olefins stream with a quantity of ethylene sufficient for conventional metathesis wherein said quantity of ethylene comprises said removed ethylene stream and an amount of external fresh ethylene selected such that the molar ratio of said external fresh ethylene to the n-butenes in said C_4 olefin stream is from zero to 0.8; and

g. passing said admixture in contact with a metathesis

catalyst and thereby producing a conventional metathesis product containing additional propylene.

2. A process as recited in claim 1 wherein said conventional metathesis product is combined with and fractionated with said autometathesis product.

3. A process as recited in claim 1 wherein said step d of removing isobutylene comprises a catalytic distillation hydroisomerization de-isobutyleneizer process wherein 1-butene is converted to 2-butene.

4. A process as recited in claim 1 wherein said C_4 olefin stream additionally contains butadiene limited to a level of less than 10,000 ppm.

5. A process as recited in claim 4 wherein said butadiene level is limited to a level of less than 500 ppm.

6. A process as recited in claim 1 where the autometathesis catalyst consists of a group VIA or VIIA metal oxide either supported or unsupported.

7. A process of claim 6 where the autometathesis catalyst is tungsten oxide on silica.

8. A process of claim 6 where the autometathesis catalyst is admixed with a Group IIA basic metal oxide double bond isomerization catalyst.

9. A process of claim 8 where the double bond isomerization catalyst is magnesium oxide.

10. A process as recited in claim 1 where the conventional metathesis catalyst consists of a group VIA or VIIA metal oxide either supported or unsupported.

11. A process of claim 10 where the conventional metathesis catalyst is tungsten oxide on silica.

12. A process of claim 10 where the conventional metathesis catalyst is admixed with a Group IIA basic metal oxide double bond isomerization catalyst.

13. A process of claim 12 where the double bond isomerization catalyst is magnesium oxide.

14. A process of claim 10 where the conventional metathesis catalyst is formulated to have both the metathesis reaction function and a double bond isomerization function.

15. A process for the production of propylene from a C_4 olefin stream containing n-butenes, isobutylene and paraffins comprising the steps of:

a. passing said C_4 olefin stream in contact with a metathesis catalyst whereby autometathesis occurs and an autometathesis product is produced containing ethylene and propylene and heavier olefins including isobutylene and paraffins;

b. fractionating said autometathesis product to remove

an ethylene stream leaving a deethyleneized stream of said propylene and said heavier olefins and paraffins;

c. fractionating said deethyleneized stream to remove propylene product leaving a depropyleneized stream of said heavier olefins and paraffins;

d. processing said depropyleneized stream to remove the C_5 + fraction leaving a mixed C_4 stream.

e. processing said mixed C_4 stream to remove the isobutylene leaving a remaining normal C_4 olefins stream also containing paraffins;

f. purging a portion of said remaining normal C_4 olefins stream to limit paraffin buildup;

g. admixing the remaining portion of said remaining C_4 olefins stream with a quantity of ethylene sufficient for conventional metathesis wherein said quantity of ethylene comprises said removed ethylene stream and an amount of external fresh ethylene selected such that the molar ratio of said external fresh ethylene to the n-butenes in said C_4 olefin stream is from zero to 0.8; and

h. passing said admixture in contact with a metathesis catalyst and thereby producing a conventional metathesis product containing additional propylene.

16. A process as recited in claim 15 wherein said conventional metathesis product is combined with and fractionated with said autometathesis product.

17. A process as recited in claim 15 wherein said step e of removing isobutylene comprises a catalytic distillation hydroisomerization de-isobutyleneizer process wherein 1-butene is converted to 2-butene.

18. A process of claim 15 where the composition of said C_4 olefin stream is such that the ratio of 2-butene to the sum of 1-butene and isobutylene is 0.5 to 1.5.